

IDENTIFIKASI POLIMORFISME GEN FSHR DAN ASOSIASINYA DENGAN SIFAT REPRODUKSI DAN PRODUKSI PADA AYAM PERSILANGAN-F3

INTISARI

Agustinus Ricky Alfiyanto
23/530905/PPT/01339

Penelitian ini bertujuan mengidentifikasi polimorfisme gen *Follicle Stimulating Hormone Receptor* (FSHR) serta asosiasinya dengan sifat reproduksi dan produksi ayam persilangan generasi ketiga (F3) hasil persilangan Merawang, Murung Panggang, dan KUB. Sebanyak 80 ekor ayam F3 betina hasil persilangan (40 ekor F3 Merawang X KUB dan 40 ekor F3 Murung Panggang X KUB) diamati untuk sifat reproduksi (bobot badan dewasa kelamin /BBDK dan umur pertama bertelur/UPB) serta produksi (jumlah dan bobot telur) selama 84 hari. Identifikasi SNP dilakukan melalui amplifikasi DNA (344bp) dan sekuensing metode Sanger. Sedangkan analisis data meliputi frekuensi alel dan genotip, heterozigositas observasi (H_o), heterozigositas ekspektasi (H_e), keseimbangan Hardy–Weinberg, serta uji asosiasi menggunakan *one way ANOVA* dan *independent sample t-test* dengan SPSS v20. Hasil menunjukkan bahwa pola persilangan berpengaruh nyata terhadap performa reproduksi dan produksi ($P < 0,05$), terutama pada bobot badan dewasa kelamin (BBDK) dan produksi telur, di mana F3-A lebih unggul daripada F3-B dengan nilai berturut-turut $1931,32 \pm 30,74$ g dan $33,85 \pm 15,54$ butir. Enam SNP pada daerah promotor gen FSHR dengan frekuensi alel 0,04–0,96, nilai H_o 0,08–0,63, dan H_e 0,07–0,48. Semua SNP berada dalam keseimbangan Hardy–Weinberg. Semua SNP diklasifikasikan sebagai polimorfik (frekuensi alel $\leq 0,99$). Asosiasi SNP 131112A>G secara umum berasosiasi signifikan dengan umur pertama bertelur pada kedua persilangan dengan genotip AG paling baik (24.56 minggu) pada F3-A dan genotip AA (23.80 minggu) pada F3-B. SNP 131147 T>C signifikan dengan produksi telur pada F3-B (genotip CT paling tinggi sebesar 35.33 btr) dan SNP 131223 C>T BBDK paling tinggi pada genotip CC sebesar 1922.16 gr. Disimpulkan bahwa pola persilangan berpengaruh nyata terhadap performa reproduksi dan produksi dan gen FSHR menunjukkan potensi sebagai kandidat penanda DNA untuk sifat reproduksi dan produksi, terutama untuk umur pertama bertelur, produksi telur, BBDK, dan bobot telur pada kedua pola F3 ayam Lokal hasil persilangan.

Kata kunci: Ayam persilangan, Generasi ketiga (F3), Polimorfisme gen FSHR, Produksi ayam, Reproduksi ayam

POLYMORPHISM OF THE FSHR GENE AND ITS ASSOCIATION WITH REPRODUCTIVE AND PRODUCTION TRAITS IN F3 LOCAL CROSSED CHICKENS

ABSTRACT

Agustinus Ricky Alfiyanto
23/530905/PPT/01339

This study aimed to identify polymorphisms in the Follicle Stimulating Hormone Receptor (FSHR) gene and their association with reproductive and production traits in third-generation (F3) crossbred chickens derived from Merawang, Murung Panggang, and KUB lines. A total of 80 F3 female chickens (40 F3-A: Merawang x KUB and 40 F3-B: Murung Panggang x KUB) were observed for reproductive traits, body weight at sexual maturity (BWSM) and age at first lay (AFL) and production traits, including egg number and egg weight, over an 84-day period. Single nucleotide polymorphisms (SNPs) were identified through DNA amplification (344bp) and Sanger sequencing. Data analysis included the calculation of allele and genotype frequencies, observed heterozygosity (H_o), expected heterozygosity (H_e), Hardy-Weinberg equilibrium, and association tests using one-way ANOVA and independent sample t-tests in SPSS v20. The results showed that crossbreeding patterns had a significant effect on reproductive and production performance ($p < 0.05$), particularly on body weight at sexual maturity (BWSM) and egg production, with F3-A outperforming F3-B $1,931.32 \pm 30.74$ g and 33.85 ± 15.54 eggs, respectively. Six SNPs were identified in the promoter region of the FSHR gene, with allele frequencies ranging from 0.04 to 0.96, H_o values from 0.08 to 0.63, and H_e values from 0.07 to 0.48. All SNPs were in Hardy-Weinberg equilibrium and were classified as polymorphic (allele frequency ≤ 0.99). The SNP 131112A>G showed a significant association with AFL in both crossbreeds, with genotype AG performing best (24.56 weeks) in F3-A and genotype AA (23.80 weeks) in F3-B. Additionally in F3-B, SNP 131147T>C was significantly associated with egg production (genotype CT showed the highest production at 35.33 eggs), and SNP 131223C>T was associated with BWSM (genotype CC showed the highest weight at 1922.16 g). In conclusion, The crossbreeding pattern has a significant effect on reproductive and production performance and the FSHR gene demonstrates potential as a candidate DNA marker for reproductive and production traits, particularly for age at first egg, egg production, BWSM, and egg weight in F3 crossbred local chickens.

Keywords: Crossbred chickens, FSHR gene polymorphism, Production traits
Reproductive traits, Third generation (F3))